



Name: _____

Date: December 16, 2015

IBSL Year 1

SEMESTER 1 FINAL EXAM
PAPER 2

Score: /50

CAC%:

IB:

INSTRUCTIONS TO CANDIDATES

- Write your name in the box above.
- Do not open this examination paper until instructed to do so.
- A graphic display calculator is required for this paper.
- Section A: answer all questions in the boxes provided.
- Section B: answer all questions on the answer page(s) provided. Write your name on the front of the answer page(s) and turn in with your examination paper.
- Unless otherwise stated in the question, all numerical answers should be given exactly or correct to three significant figures.
- A clean copy of the *Mathematics SL formula booklet* is required for this paper.
- The maximum mark for this examination paper is [50 marks].

Full marks are not necessarily awarded for a correct answer with no working. Answers must be supported by working and/or explanations. In particular, solutions found from a graphic display calculator should be supported by suitable working, for example, if graphs are used to find a solution, you should sketch these as part of your answer. Where an answer is incorrect, some marks may be given for a correct method, provided this is shown by written working. You are therefore advised to show all working.

SECTION A

Answer **all** questions in the boxes provided. Working may be continued below the lines if necessary.

1. [Maximum mark: 5]

Let $f(x) = 2x + 3$ and $g(x) = x^3$.

(a) Find $(f \circ g)(x)$. [2]

(b) Solve the equation $(f \circ g)(x) = 0$. [3]

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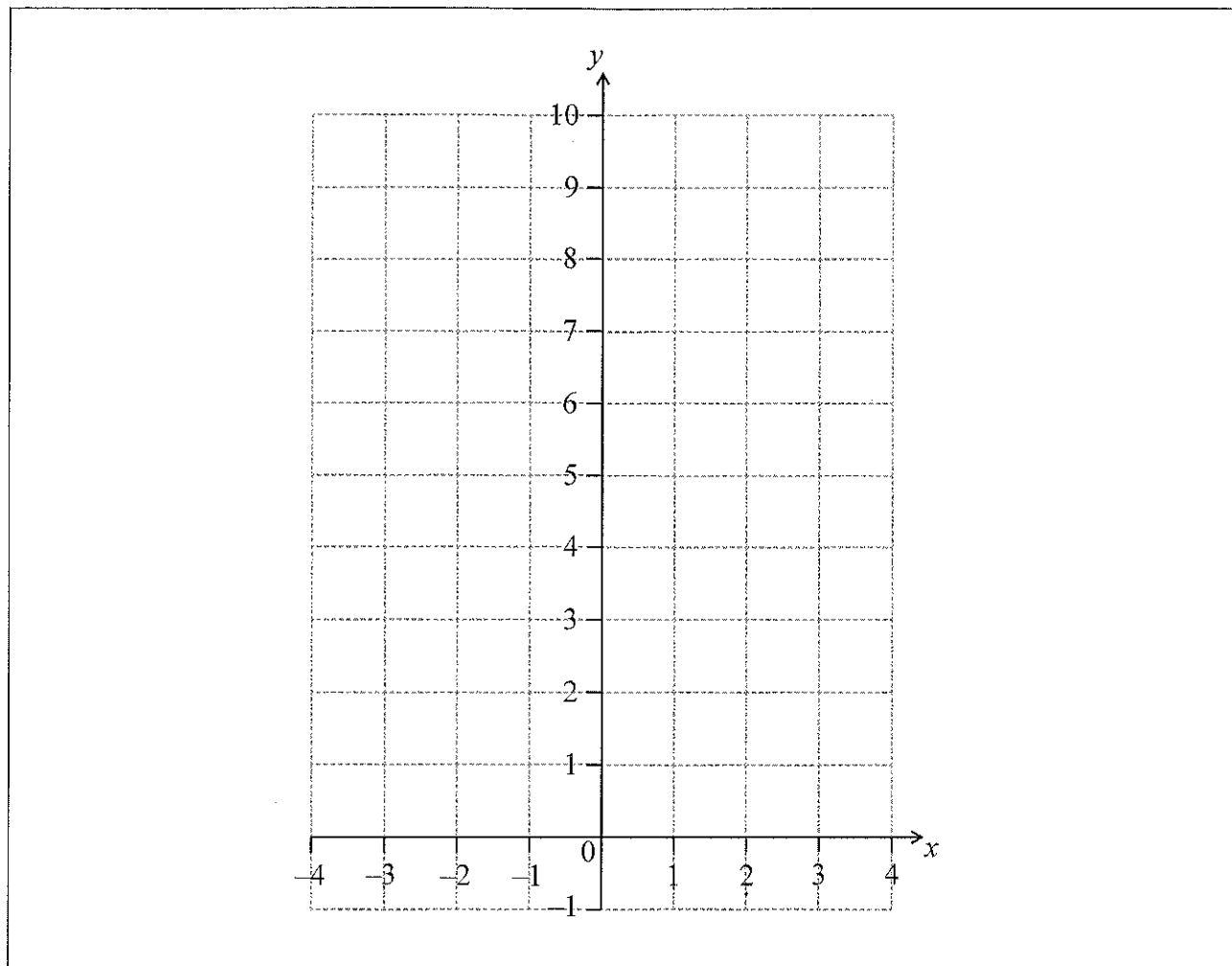


5. [Maximum mark: 6]

Let $f(x) = e^{x+1} + 2$, for $-4 \leq x \leq 1$.

(a) On the following grid, sketch the graph of f .

[3]



(b) The graph of f is translated by the vector $\begin{pmatrix} 3 \\ -1 \end{pmatrix}$ to obtain the graph of a function g .

Find an expression for $g(x)$.

[3]

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6. [Maximum mark: 6]

Consider the expansion of $\left(\frac{x^3}{2} + \frac{p}{x}\right)^8$. The constant term is 5103. Find the possible values of p .

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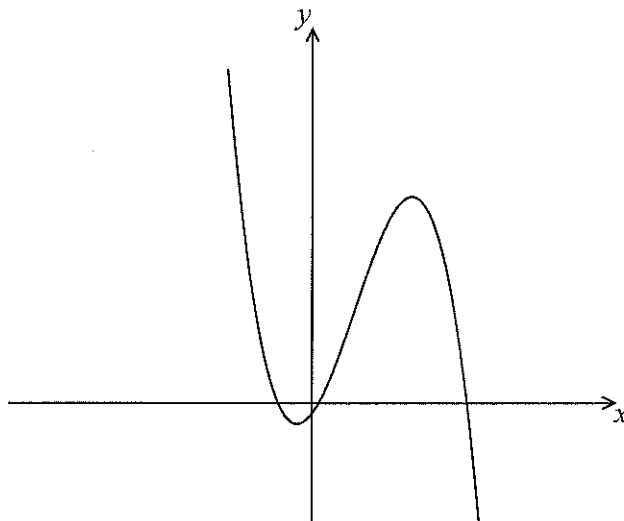
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7. [Maximum mark: 7]

The following diagram shows part of the graph of $f(x) = -2x^3 + 5.1x^2 + 3.6x - 0.4$.



(a) Find the coordinates of the local minimum point. [2]

(b) The graph of f is translated to the graph of g by the vector $\begin{pmatrix} 0 \\ k \end{pmatrix}$. Find all values of k so that $g(x) = 0$ has exactly one solution. [5]

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Turn over

Section B

Answer **all** questions in the answer booklet provided. Please start each question on a new page.

9. [Maximum mark: 14]

The first two terms of a geometric sequence u_n are $u_1 = 4$ and $u_2 = 4.2$.

(a) (i) Find the common ratio.

(ii) Hence or otherwise, find u_5 .

[5]

Another sequence v_n is defined by $v_n = an^k$, where $a, k \in \mathbb{R}$, and $n \in \mathbb{Z}^+$, such that $v_1 = 0.05$ and $v_2 = 0.25$.

(b) (i) Find the value of a .

(ii) Find the value of k .

[5]

(c) Find the smallest value of n for which $v_n > u_n$.

[4]

